ChatGPT

Inferred Refinery Crude Slates and BP Assay Matches

What I produced

I processed your uploaded refinery workbook and generated an inferred crude-slate match for every active refinery row in it. The output covers **822 active refineries** from the file and adds, for each facility, an estimated crude-quality window, a plain-English slate archetype, the **top three closest BP assay matches**, and a confidence band. This is an inference layer built from refinery configuration, complexity, geography, and basin logic rather than a claim that any refinery is running those exact cargoes today.

A few broad patterns emerged from the output. In my matched file, the most common top analogs were **Oman Export Blend, Mars, Azeri Light (Supsa), Johan Sverdrup, Kirkuk, Heavy Louisiana Sweet, Thunder Horse, Basrah Medium, and Murban**. That is directionally consistent with how refinery complexity shapes crude tolerance and how major import regions source feedstock: simple plants bias lighter/sweeter, coking plants bias heavier/sourer, and East/South Asian import systems are still strongly linked to Middle Eastern barrels. [1]

How I inferred each refinery's likely slate

The model starts from **refinery type** and **Nelson complexity**. The EIA explains that heavier crude oils need more expensive downstream processing to make high-value products, while the Nelson Complexity Index is the standard way to measure how much secondary conversion a refinery has. EIA also notes that coking capacity is used to process heavy and medium crude oils efficiently, while condensate splitters process condensate, which is lighter than crude oil. That is why, in the output, topping and hydroskimming plants are biased toward light-to-medium sweet or lightly sour barrels, cracking refineries toward medium crudes, cokers and upgraders toward heavier and/or sourer barrels, and splitter sites toward condensates. [2]

The second layer is **regional sourcing logic**. East and South Asian refining systems remain heavily exposed to Middle Eastern flows: South Korea mostly imports crude from the Middle East, China sourced **54%** of its crude oil and condensate imports from the Middle East in 2024, Singapore imports over two-thirds of its crude from the Middle East, and EIA estimates that **84%** of crude oil and condensate moving through Hormuz in 2024 went to Asian markets. By contrast, northwestern European coastal sites sit much closer to North Sea streams, and UAE refining historically centered on Murban before ADNOC's crude-flexibility projects widened the feedstock envelope. [3]

The last layer is **assay similarity scoring**. After assigning each refinery a target API, sulfur, and acidity midpoint plus a plausible operating band, I ranked your BP crude list by quality distance and then adjusted the ranking with origin-pool bonuses. Same-country grades were favored where your BP list contains them, then regional pools such as **North Sea, Middle East, U.S. Gulf, West Africa, Caspian,** or **condensates**. This matters because your BP list does not include many staples that real refineries often run, such as **Maya,**

Arab Heavy, Urals, CPC Blend, or Canadian synthetic crude, so some of the answers are intentionally **analogs** rather than literal market favorites.

What the matching says at a global level

Across the file, the output breaks into a few clean clusters. **Condensate splitters** overwhelmingly map to **Cossack, Culzean, Skarv, Northwest Shelf Condensate,** and **Tangguh Condensate**. **U.S. Gulf cokers** map largely to **Mars, Southern Green Canyon,** and **Thunder Horse**. **Northwest European cracking sites** map mostly to **Alvheim Blend, Brent, Ekofisk, Johan Sverdrup,** and **Forties**. **East and South Asian complex refineries** skew toward **Oman Export Blend, Basrah Medium, Kirkuk, Murban,** and in the heaviest cases **Basrah Heavy**. **Simpler topping and hydroskimming plants** often resolve toward **Azeri Light (Supsa), Johan Sverdrup, Ekofisk, Heavy Louisiana Sweet,** and other lighter or medium-sweet analogs.

Those buckets line up with public evidence. EIA says Japanese refineries are less complex and therefore tend to process lighter and sweeter grades, while South Korea, China, and Singapore all sit in import systems dominated by Middle Eastern barrels. EIA also says U.S. Gulf Coast refineries are configured mostly to process heavy, sour crude oils, and Shell's official Pernis materials show residue-upgrading investments that increase the proportion of crude intake converted into cleaner transport fuels. [4]

Representative refinery examples

The table below is a short preview from the full output workbook.

Refinery	Country	Type	Top BP match	Second match	Third match	Confidence
Ulsan	South Korea	Coking	Basrah Medium	Oman Export Blend	Kirkuk	Medium
Dayushan Island	China	Coking	Basrah Medium	Oman Export Blend	Kirkuk	High
Jamnagar II	India	Coking	Basrah Heavy	Basrah Medium	Oman Export Blend	High
Al-Zour	Kuwait	Cracking	Basrah Medium	Kirkuk	Oman Export Blend	Medium
Port Arthur II	United States	Coking	Mars	Southern Green Canyon	Thunder Horse	High
Pernis	Netherlands	Cracking	Alvheim Blend	Brent	Ekofisk	Medium

Refinery	Country	Type	Top BP match	Second match	Third match	Confidence
Bandar Abbas II	Iran	Condensate Splitter	Cossack	Skarv	Culzean	High
Fujairah I	United Arab Emirates	Topping	Murban	Azeri (Ceyhan)	Azeri Light (Supsa)	Medium

A few of these are especially well anchored by public evidence. **Jamnagar** is a strong heavy/sour case because Reliance says the refinery can process heavy and sour crude, that its configuration gives it a wide crude slate, and that the Jamnagar refineries process a wide variety of crude oils. Combining that with EIA's evidence that Asia is the main destination for Iraqi crude exports and that most Hormuz flows go to Asian markets makes **Basrah Heavy / Basrah Medium / Oman Export Blend** a credible analog set for the most complex Jamnagar trains. [5]

Al-Zour is another good calibration point. KIPIC says the refinery was designed to process various types of Kuwait crude, including **Kuwait Heavy Crude**, and official project communications describe the plant as processing heavy oils. Because your BP list does not contain Kuwait Heavy itself, the closest substitutes in the model naturally collapse toward **Basrah Medium**, **Kirkuk**, and **Oman Export Blend** as the nearest Middle Eastern analogs. [6]

Port Arthur II resolves very cleanly to **Mars / Southern Green Canyon / Thunder Horse** because EIA says U.S. Gulf Coast refineries are well suited to heavy sour crude and are configured mostly for heavy, sour processing. **Pernis** resolves to North Sea barrels because Shell's official Pernis materials describe residue-upgrading investments, while EIA's UK and Norway materials underscore the depth of North Sea crude infrastructure. **Bandar Abbas II** resolves to condensate analogs because condensate splitters are designed to run condensate rather than ordinary crude. [7]

How to read the confidence bands

A **High** confidence row usually means one of three things: the refinery's country has a direct analog in your BP list, the refinery type and Nelson complexity strongly constrain what it can run, or the country sits inside a very well-defined import basin with a narrow group of likely substitutes. That is why U.S. Gulf cokers, North Sea refineries, Middle Eastern producer-country refineries, and condensate splitters often rank higher.

A **Medium** confidence row usually means the answer is probably directionally right but the exact analog is more contestable because your BP list is missing some major real-world grades. **Low** confidence rows are usually the inland, simple, or under-covered cases where the refinery can be characterized by configuration, but the best geographic analog in the BP list is only approximate. In practical terms, low-confidence rows are still useful for screening, but they should be treated as **quality analogs**, not as assertions about actual nominated cargoes.

Downloadable outputs

The enriched workbook is here:

[Download the refinery crude-slate workbook]

A flat CSV version is here:

[Download the refinery crude-slate CSV]

The workbook includes a **Matches** sheet with the inferred slate for each refinery, an **Original plus matches** sheet that preserves the original GlobalData fields alongside the new columns, and summary tabs for **type-level distributions**, **top BP match counts**, **confidence**, and **methodology**.

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1 2 Oil and petroleum products explained Refining crude oil
https://www.eia.gov/energyexplained/oil-and-petroleum-products/refining-crude-oil-inputs-and-outputs.php?utm_source=chatgpt.com

3 https://www.eia.gov/international/analysis/country/KOR
https://www.eia.gov/international/analysis/country/KOR

4 Japanese refineries close as the country's petroleum ...
https://www.eia.gov/todayinenergy/detail.php?id=61063&utm_source=chatgpt.com

5 Touching lives. Transforming India.
https://www.ril.com/sites/default/files/2022-12/2007-2008.pdf?utm_source=chatgpt.com

6 Al Zour Refinery
https://kipic.com.kw/al-zour-refinery/?utm_source=chatgpt.com

7 Crude oil swaps with Mexico could provide economic and ...
https://www.eia.gov/todayinenergy/detail.php?id=22872&utm_source=chatgpt.com